PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Ali Shajii, et al.
Serial Number:	10/822,358
Filing Date:	12 April 2004
Title:	PULSED MASS FLOW DELIVERY SYSTEM AND METHOD
Examiner:	Zervigon, Rudy
Art Unit:	1763
Docket No.:	56231-457 (MKSK-143)
Confirmation No.:	3068

VIA EFS-WEB

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF W. RANDOLPH CLARK UNDER 37 CFR § 1.132

I, W. Randolph Clark, declare as follows:

1. I am the Vice President of Advanced Application Development at MKS Instruments, Inc. (the Assignee of the above-referenced application, as recorded at Reel/Frame 015205/0197). In this and like capacities, I have been extensively involved in product development in the field of mass flow controllers for over 25 years. I have written and spoken extensively in this field and am considered an expert in the more general field of material control for vacuum processes.

2. I am also one of the co-inventors on the above-identified patent application and am familiar with its prosecution history.

3. I have read the statements made by the Examiner in the final Office Action mailed 17 September 2008, with respect to the claims at issue being rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent Application Publication No. 2004/0244837 to Nawata et al. ("Nawata") in view of U.S. Patent No. 6,193,212 to Ohmi et al. ("Ohmi").

4. For a number of reasons, the claimed invention of the subject application has critical differences that set it apart from the system of Nawata with regards to patentability and commercial success, as will be explained.

5. As stated previously in papers submitted on behalf of MKS Instruments during the prosecution of the subject application, the Nawata application teaches a system for pulsed delivery of a relatively constant flow rate. In other words, the object of the Nawata system is to deliver a total flow rate over a relatively long period of time (for example a minute) but do it by delivering lots of small pulses of gas (30 milliseconds each). Since many gas pulses are being delivered in typical operation of the Nawata system, if one of the pulses is not correct, then it can be corrected on the next pulse. The reason each pulse may not be correct can be due to a number of factors. The pressure the volume is charged up to may not be the same as for a previous cycle due to either the inlet valve not opening to the same level as before, or, the valve may not open and close in the same time periods. The flow out may not be the same as the last cycle due to various factors including the following: (i) the starting pressure may not be the same as before, (ii) the outlet valve may not open and close in the same time periods, and (iii) the outlet pressure may not be the same as before The Nawata system measures the amount of gas delivered in a pulse, **after the pulse is delivered**. This is done by measuring the pressure in the volume after the inlet valve is closed and again after the outlet valve has closed, and after a certain amount of time is allowed to predict the pressure that remains in the volume. This waiting time in Nawata is for the gas to approach the final (average) temperature of the volume, which is typically ambient temperature.

6. In contrast, for the claimed invention of the subject application, each pulse is important and the proper amount of gas delivered in each pulse is critical. For the claimed invention, pressure and temperature are measured with relatively fast transducers and the claimed invention can utilize a model of the response of the transducers due to a change in the gas inside the volume (for example a pulse). Therefore, measurements and calculations can be made of the amount of gas being delivered **while it is actually being delivered** – as opposed to after a pulse has been delivered. When the correct amount of gas has been delivered according to calculations performed as the outlet valve is open, the outlet valve is turned off and closed. The amount of gaseous mass being delivered is

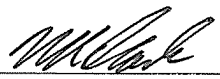
measured, and from the rate of delivery, a prediction is made as to when the correct amount will be delivered given the turn off time (response time) of the outlet valve. At the predicted time (when a mass setpoint is reached), the outlet valve is commanded off.

7. For the system of Nawata, there are several things that can change between pulses and therefore make a single pulse not deliver the desired amount of gas. Nawata would correct in the next cycle (assuming the conditions stayed the same) but the claimed design/method of the subject application makes sure each pulse delivers the correct amount. As an example of the versatility of the claimed approach in the subject application, there is no requirement to recharge the volume after each pulse. The claimed system will compensate for the fact that there is less pressure in the volume on the second pulse, and keep the outlet valve on for a longer period of time until the correct amount of gas is delivered.

8. For the preceding reasons, I believe that the claims of the subject application are unobvious and novel over the Nawata reference.

9. I hereby declare that all statements made herein are of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the subject application or any patent issuing there from.

Respectfully submitted,



W. Randolph Clark

Signed November 11, 2008